CORRES. CONTROL
OUTGOING LTR NO.

DOE ORDER #

04 RF 01252

DIST.	LTR	ENC
BERARDINI, J.	X	
BRAILSFORD, M.D		
FERRERA, D.W.	X	
FERRI, M.S.		
FULTON, J.C.		
GIACOMINI, J..		
HALL, L.		
MARTINEZ, L.A.		
PARKER, A.M.		
POWERS, K.		
SCOTT, G.K.		
SHELTON, D.C.	X	
SPEARS, M.S.		
TRICE, K.D.		
VOORHEIS, G.M.		
WIEMELT, K.L.	X	X
THORNBURG, AMY	X	
COR. CONTROL	X	X
ADMN. RECORD	x	x
WASTE REC. CTR.		
TRAFFIC		
PATS/130		
CLASSIFICATION:		
UCNI		
UNCLASSIFIED		
CONFIDENTIAL		
SECRET		

AUTHORIZED CLASSIFIER SIGNATURE
Exemption – CEX-105-01

Date

IN REPLY TO RFP CC NO:

ACTION ITEM STATUS

☐ PARTIAL/OPEN

☐ CLOSED

LTR APPROVALS:

ORIG & TYPIST INITIALS

Revision 7/04

KAISER•HILL COMPANY

December 9, 2004

04-RF-01252

Mr. Joseph A. Legare, Director
Project Management Division
DOE, RFPO

Mr. Steve Gunderson
Colorado Department of Public Health and Environment
4300 Cherry Creek Drive South
Denver, CO 80246-1502

Mr. Mark Aguilar
U.S. Environmental Protection Agency
999 18th Street, Suite 300
Denver, CO 80202-2466

TRANSMITTAL OF THE DRAFT NFAA JUSTIFICATION FOR PAC 000-500, SANITARY SEWER SYSTEM – KLW-052-04

Enclosed are copies of the Draft NFAA Justification for PAC 000-500, Sanitary Sewer System. We will contact your staff to schedule a meeting the week of December 20th to resolve comments and finalize the text.

If you have any questions, please contact me at extension 9883.

Karen L. Wiemelt
Manager, Environmental Restoration Programs

KLW:dm

Orig and 1 cc – Joseph Legare
cc: Norma Castaneda

Enclosures:
As Stated

RECEIVED
DEC 15 2004
ADMIN RECORD

Kaiser-Hill Company, L L C
Rocky Flats Environmental Technology Site, 10808 Hwy. 93 Unit B, Golden, CO 80403-8200 • 303-966-7000

NO FURTHER ACCELERATED ACTION JUSTIFICATION

FOR SANITARY SEWER SYSTEM

PAC REFERENCE NUMBER: 000-500

IHSS Number:	Not Applicable
Operable Unit	Industrial Area
IHSS Group	000-3
Unit Name:	Sanitary Sewer System
Approximate Location:	Not Applicable

Date(s) of Operation or Occurrence

1952 - 2004

Description of Operation or Occurrence

Background Information

The RFETS sanitary sewer system was used for transport, storage, and treatment of sanitary waste since RFETS began operations in 1952. Figure 1 shows the sanitary sewer system as it was depicted in the Historical Release Report (DOE 1992). Various drains, sinks, sumps, and latrines located in RFETS buildings discharged to central collection lines which transported the waste to the Sanitary Sewage Treatment Plant (Building 995). RFETS wastes which were incompatible with sanitary sewage treatment were designated process wastes and were handled in a separate system from sanitary wastes (PAC 000-121, Original Process Waste Lines). In each RFETS building which generated process waste, waste discharge points (drains, sinks, sumps, etc.) were designated as either sanitary waste or process waste receptacles, and were plumbed separately into the appropriate waste system. In some plant facilities, wastes were, or had historically been, collected and temporarily stored in tanks plumbed into both systems, and transferred to the appropriate system based on analytical results (DOE 1992).

Historically, some storm water sources, such as roof drains, were connected to the sanitary sewer system. These were previously disconnected and there were no known cross connections between the storm drain and the sanitary sewer system. In addition, cooling tower sumps were generally pumped into the sanitary sewer system to dispose of cooling tower blowdown water. These were disconnected as the cooling towers were decommissioned (DOE 2004a).

2

Closure of the sanitary sewer system is nearing completion. Closure activities have been conducted as described in the Technical Memorandum – Closure Strategy for the Rocky Flats Environmental Technology Site Sanitary Sewer System (DOE 2004a).

Prior to closure, the estimated total length of the sanitary sewer lines was approximately 67,000 feet including active and abandoned lines. The diameter of the lines ranged from 3 to 12 inches with about 30,000 feet of 6-inch and larger lines and about 11,500 feet of 4-inch lines. The lines included vitrified clay pipe (VCP), polyvinyl chloride pipe (PVC), cast iron and ductile iron pipe. PVC lines were installed in 1984 or later. In 1985, some of the system was rehabilitated to reduce infiltration and leakage. Figure 2 depicts the sanitary sewer system and its components in 2004 (DOE 2004a).

The sanitary sewer collection system flowed by gravity from west to east across the Industrial Area. However, some facilities, such as the Building 881 and Building 771 clusters, also had lift stations to pump sewage where gravity flow was not possible. There were two sections of the sanitary sewer system: the north section collected flow from the plant area formerly located within the Protected Area (PA) and also the 371 trailers, B116 and T117A; the south section collected flow from the rest of the plant exterior to the PA. The two sections joined at Building 990 (DOE 2004a).

From Building 990, wastewater flowed into one of three 110,000-gallon influent storage tanks at the Waste Water Treatment Facility (WWTF) allowing inflow to be collected while another tank holding the previous day's flow was processed. The Site's wastewater treatment plant was an activated sludge treatment facility with a design capacity of 0.5 million gallons per day (MGD). In 2003, normal flows were approximately 0.16 MGD. The flow rate continued to decline until it was taken out of service in October 2004 (DOE 2004a).

The lengths of various main sewer lines types were calculated based on Figure 2 and are presented in Table 1. The lengths presented are only for the main lines. Numerous smaller lines and laterals are associated with the buildings and were not included in this estimate. As shown on Table 1, 57% of the sewer system was active, and 43% had been abandoned prior to closure activities. Of the abandoned lines, about three fifths of them had already been abandoned prior to 1990. Many of these abandoned lines are believed to have been flushed, plugged, or removed. The more recent abandoned lines and the active lines in 2004 were flushed and plugged as part of the closure activities. Only a small fraction of the lines could not be located in the field (DOE 2004a).

3

Table 1 Sanitary Sewer Line Summary in 2004

Component Lines	Length (feet)	Length (miles)	Percentage of Total Lines
Current Sanitary Sewer Lines All lines flushed and plugged at completion of closure	**37,039**	**7.01**	**57%**
Previously Abandoned Lines	**27,998**	**5.30**	**43%**
Abandoned Lines, Flushed and Plugged at Completion of Closure	10,809	2.05	17%
Lines Abandoned Prior to 1990	15,520	2.94	24%
Abandoned Lines, Not Located	1,072	0.20	2%
Total Lines	**65,037**	**12.32**	**100%**

Manhole inspections and photographs indicated that sanitary sewer lines were generally greater than three feet below grade with the exception of the lines in the 130 trailer complex on the west side of the Site. Lines associated with buildings were generally less than three feet below grade because the system relies on gravity flow and shallower lines were required for flow from the buildings into the main lines (DOE 2004a).

Discharges to the Sanitary Sewer System

In the past, some non-domestic wastes were discharged into the sanitary sewer system. These discharges changed over time in response to internal guidelines and to State and Federal regulations. Much of the potential contaminants discharged to the sanitary sewer system were derived from laundry waste. A 1967 survey indicated that of the average daily flow of 250,000 gallons, 21,000 gallons were laundry waste. However, a 1973 investigation of plutonium releases to the sanitary sewer system indicated that 88% of the plutonium in the sanitary sewer system at that time originated from the numerous laundries on Site. This primary source of contaminated discharges was eliminated when potentially contaminated laundry began being laundered offsite in 1996. There was potential for liquids to be dumped into the sanitary sewer by employees but this was not expected to be significant (DOE 2004a).

Table 2 summarizes information compiled on the currently known non-sanitary waste streams discharged into the sanitary sewer system through 1991. A few other, non-documented non-sanitary releases to the system may also have occurred during this timeframe. For example, there is information that process waste backed up and caused a toilet in B701 to overflow (DOE 2004a).

Excluded from Table 2 are discharges of compounds not anticipated to be contaminants of concern such as acids, dyes, unneutralized demineralization waste from the steam plant, ethylene glycol, and oil. A complete listing is found in the Historical Release Report (DOE, 1992).

4

Table 2 Non-Sanitary Discharges to the Sanitary Sewer System

Waste Type	Description
Lab Wastes	8/1953 & 4/1965 – Building 123 laboratory waste with high nitrates and unspecified radioactivity from urinalysis specimens. Unknown – Building 331 Old Lab Area had unspecified radioactive contamination around footing drains plumbed into sanitary sewer.
Laundry waste	1953 – Unknown Building 442 Laundry waste water discharged with varying radioactivity levels 9/55 - 2,700 gallons of laundry waste discharged with alpha radioactivity exceeding 8,500 disintegrations/minute/liter (d/m/l) discharged while leaks in Building 881 process waste line were repaired. 1986 – Building 444 Elevator shaft sump and employee wash facilities are plumbed into sewer; small amounts of uranium oxide and beryllium potentially entered sanitary sewer. 1953 – Unknown Building 771 Laundry waste exceeding the radioactivity limit for direct discharge to Walnut Creek is diluted with sanitary sewer system effluent to meet discharge limits. Building 881 Process waste and laundry waste discharged to sanitary sewer. 1952-53 discharge limit is 10,000 d/m/l. 1954 discharge limit is 8,500 d/m/l. 1956 discharge limit suspended for indefinite period. 1986 – Document states that 2 restrooms in Building 883 are in use where workers do not have to cleanup prior to use.
Hexavalent chromium	Mid-1962 -Several discharges of oil and hexavalent chromium waste. 6/26/63 - Unknown amount of hexavalent chromium solution discharged. 5 parts per millions (ppm) hexavalent chromium at WWTF settling tank; 0.6 ppm at effluent. 12/12/63 - Unknown quantity of hexavalent chromium solution discharged to the sanitary sewer; 20 ppm was detected at settling tank, 0.18 at effluent. 2/1989 - Chromic acid stored in Building 444 overflowed tanks and a containment berm and entered the building's foundation drains. The spill collected in a sump that automatically transferred to the sanitary sewer system with an estimated 30 pounds of chromium released to the sanitary sewer system. After the chromic acid release, Building 444 foundation drains were plumbed to process waste system.
Process waste	11/1964 – Releases to sanitary sewer because of leaks in process waste lines from Buildings 441, 444, 881 and 883. 1974 - A document states that radioactive waste from Building 779 was pumped to sanitary sewer if it does not exceed unspecified discharge limits. 1978- A document states that all drains in the Building 705 research facility drained to the sanitary sewer system. Uranium, beryllium, chromium and acids were used at this location. 1978 –A building 881 process waste sink was found to be plumbed into sanitary sewer. 1979 – A document states that unspecified chemicals from Building 559 disposed into sanitary drain. 1966 – Documents allow up to 500 milliliters of unspecified acids, bases and solvents can be discharged into sanitary sewer in Building 991.
Paint	9/11/70 – Silver paint used in Building 444 poured down unspecified drain and cleaned up. 1980 – Unspecified type and amount of paint released from Building 374 into sanitary sewer. Spill was controlled without reportedly causing environmental impact. 1990 – Building 374 discharged paint containing volatile organic compounds to the sanitary sewer.
Radioactive iodine	7/24/79 – Unknown amount of iodine-131 was released to the sanitary system as a result of an employee medical treatment. 8/09/79 - Unknown amount of iodine-131 was released to the sanitary system as a result of an employee medical treatment.
Tritium	4/73 – 5/73 - An estimated 50 - 100 curies of tritium were inadvertently released from Building 779 to the sanitary sewer system. One release contained an estimated six curies of tritium in 7,800 gallons of waste, and a second release contained an estimated 44 curies in 8,000 gallons of waste. 8/17/79 – 2,000 picoCuries per liter (pCi/l) were detected in effluent. Source was the steam condensate from Buildings 771, 776 and 779 that originated as Solar Evaporation Pond water. 1,000 gallons per hour were discharged until October 1979.
Scrubber solution	10/25/89 – Scrubber system in Building 444 overflowed. Effluent showed higher alpha and beta radioactivity than normal.

In 1991, EPA and DOE entered into the National Pollutant Discharge Elimination System (NPDES) Federal Facilities Compliance Agreement (FFCA) that implemented more controls over non-sanitary releases to the sanitary sewer system. Based on a review of spill records compiled since 1991, only a few spills are known that may have introduced potential contaminants of concern into the sanitary sewer system. Most of the recent spills into the system were small, less than 100-gallon quantities of ethylene glycol or oils. The following discharges since 1991 are currently documented:

5

- 1994 – 7 gallons of photographic developer/fixer solution released into the sanitary drain in B111. Floor area investigated in 2001 and determined to require no action.
- 1995 – approximately one pound of mercury was spilled onto the floor in Building 443. Most of the mercury was believed to be caught in the floor drain P-trap and was retrieved.
- 1997 – approximately 50 gallons of water with NALCO inhibitor, a possible chromium source, was discharged into the sanitary sewer from the B460 cooling tower.

Releases from the Sanitary Sewer System

Treated effluent from Building 995 was discharged to Pond B-3 (PAC NE-142.7). Pond B-3 released through outlet works to Pond B-4 (PAC NE-142.8). Pond B-4 is released via outlet works to Pond B-5 (PAC NE-142.9), the terminal pond. Ponds B-1 (PAC NE-142.5) and B-2 (PAC NE-142.6) are isolated from the rest of the drainage, and were used for spill control. The PAC narratives in the 1992 HRR contain detailed historical information on discharges to the ponds. Sanitary system sludges containing low levels of radionuclides were historically disposed of onsite in burial trenches (Trenches T-2 through T-11 [PACs NE-110, 900-109, and NE-111.1 through 111.8). The 1992 HRR PAC narratives provide detailed information on these sludges.

The available information on other releases from the sanitary sewer system are summarized in other PAC narratives. PAC 700-144 (Sewer Line Break) and PAC 800-145 (Sanitary Waste Line) target releases from sanitary sewer lines which historically have handled laundry water containing low concentrations of radionuclides. PAC 900-141 (Sludge Dispersal) addresses wind dispersion of radioactively contaminated sanitary system sludges from drying beds near Building 995. PAC 100-604 (T130 Complex Sewer Line Breaks) targets sanitary sewer line leaks in 1990 at the T130 office trailer complex west of the main RFETS production area (DOE 1992).

Physical/Chemical Description of Constituents Released

Waste streams which historically have been discharged to the sanitary sewer system include laundry water, laboratory wastes, treated process waste effluents, photographic processing wastes, miscellaneous waste chemicals, and certain other waste streams according to the guidelines or regulations in existence at the particular time. Table 2 contains information regarding types and quantities of constituents released in these routine discharges (DOE 2004a).

Responses to Operation or Occurrence

There was no specific response to the tritium release; however, because tritium has a short half life (12.5 years) and exists as hydrogen in water molecules, it quickly dissipates in the environment. The lack of tritium detections during Segment 4 Point of Compliance Monitoring on Walnut Creek has resulted in its removal as an Analyte of Interest for the current monitoring program (DOE 2004b).

6

A RCRA Contingency Plan Implementation Report (89-001) was prepared and submitted for the chromic acid release of February 1989 (DOE 1992).

Closure of the sanitary sewer system was conducted in accordance with the Technical Memorandum – Closure Strategy for the Rocky Flats Environmental Technology Site Sanitary Sewer System (DOE 2004a). The Technical Memorandum provides the rationale for No Further Accelerated Action (NFAA) for the sanitary sewer system based on process knowledge and existing analytical data. This is discussed further in the next section. Given the NFAA rationale for the sanitary sewer system, the closure activities associated with the system are performed as a Best Management Practice (BMP), or are part of the on-going building Decontamination and Decommissioning (D&D) Program. Closure of the sanitary sewer system is summarized in Table 3. Specific releases to or from the sanitary sewer system that are designated PACs have either been closed with regulatory agency approval, or will be closed (see Table 3). The sanitary sewer closure is discussed further below.

TABLE 3
CLOSURE SUMMARY FOR THE SANITARY SEWER SYSTEM

Sanitary Sewer Component	Closure Summary	Comments
Sewer Lines Beneath and Near Buildings, including Building 995	Lines flushed, lines removed within 3 feet of surface, and pipe ends (including pipes cut at depths greater than 3 feet) grouted that were not removed	Closure in accordance with Facility Disposition RSOP (DOE, 2004c)
Operating Lines, Manholes, and Lift Stations	1. Lines flushed, lines removed within 3 feet of surface, and pipe ends (including pipes cut at depths greater than 3 feet) grouted that were not removed, 2. Equipment in lift stations removed, manholes and lift station structures removed to 3 feet below final grade, pipe ends surveyed and plugged, and bottom of manholes and lift stations grouted. 3. Pipe bedding material disrupted at strategic locations.	A Best Management Practice in accordance with the Closure Strategy for the Sanitary Sewer System (DOE 2004a)
Abandoned Lines	Where known, lines within 3 feet of final ground surface removed, otherwise pipe ends surveyed and plugged	A Best Management Practice in accordance with the Closure Strategy for the Sanitary Sewer System (DOE 2004a)
Sanitary Sewer Components in other IHSSs		
PAC 700-144 - Sewer Line Break	PAC 700-144 is in IHSS Group 700-3, which will be closed in FY05	ER RSOP Notification #04-04 (DOE 2004d)
PAC 800-145 - Sanitary Waste Line	Closure approval in 1997	Closed through the Operable Unit 1 (OU 1) Corrective Action Decision/Record of Decision (CAD/ROD) (DOE 1997)
PAC 800-106 – Building 881 Outfall	Closure approval in 1997	Closed through the Operable Unit 1 (OU 1) Corrective Action Decision/Record of Decision (CAD/ROD) (DOE 1997)

Sanitary Sewer Component	Closure Summary	Comments
PAC 900-141 - Sludge Dispersal	No Further Action approval in 1999	Regulatory agency approval of 1997 Annual Update to Historical Release Report (EPA et. al. 1999)
PAC 100-604 - T130 Complex Sewer Line Breaks	No Further Action approval in 2002	PAC 100-604 was one of the PACs proposed for NFA by the NFA Working Group, and approved by the regulatory agencies (EPA et. al. 2002)

Sanitary Sewer System Closure

As shown in Table 3, the Sites sanitary sewer system, including the WWTF (Building 995 [B995] cluster[1], is being closed in accordance with the Facility Disposition RFCA Standard Operating Protocol, rev 1 (FD RSOP) (DOE, 2004c), and the Closure Strategy for the Sanitary Sewer System (DOE 2004a). Closure activities are nearly completed and will be documented in the project closeout reports for the B995 complex. Closure of the sanitary sewer system included flushing of all active and recently abandoned lines, removal of all lines and structures within 3 feet of the surface, and plugging of all open lines.

Disruption of the utility trenches associated with the sanitary sewer system occurred at two places to further reduce east west flow of groundwater through or around the sanitary sewer lines:

- 700 Area where the alluvium thins over an apparent bedrock high; and
- 800 Area north of the locations of B865/886 along Central Avenue.

Other areas that were disrupted as part of plant closure which also act to reduce the flow of groundwater are:

- South of B881 where the sanitary sewer lift station was removed and backfilled.
- West of the WWTF where sanitary sewer lines were removed, the bedding material disrupted and the excavations backfilled.
- North of B771 where the sanitary sewer lift station was abandoned in place and the area was backfilled, reducing the potential for groundwater to reach surface water.
- South and west of B371 where a segment of the sanitary sewer line was removed during the land reconfiguration activities, significantly reducing the potential for groundwater collection in the sanitary sewer.

[1] The B995 cluster includes buildings 971, 972, 973, 974, T974A, 975, 976, 977, 988, 988A, and 990 as well as the influent and effluent storage tanks and the discharge line along the B-Series Ponds.

Waste Sampling and Analysis

In consultation with the Colorado Department of Public Health and Environment (CDPHE), grab samples of solids within the sewer pipes were collected at locations shown on Figure 3, for the purpose of determining if additional BMPs were necessary beyond those generally prescribed by the Closure Strategy (DOE 2004a). These samples were analyzed for metals and radionuclides and the analyte concentration data was compared to Wildlife Refuge Worker (WRW) soil Action Levels (ALs) (DOE et. al 2003).[2] The data are summarized in Table 4. As shown on Figure 3, only two locations had waste solids where the analyte concentrations were above the WRW ALs; arsenic (26.0 mg/kg) exceeded the WRW AL (22.2 mg/kg) at the Building 771 lift station; and chromium (1,300 mg/kg) and uranium-235 (9.8 pCi/g) exceeded the WRW ALs of 268 mg/kg and 8 pCi/g, respectively, at the Building 881 lift station. Because there is no pathway to surface water at the B771 lift station, and the B881 lift station was removed, additional BMPs were not considered at these locations. WRW ALs were also not exceeded at the one location (south of Building 881) where surface soil was sampled (see Figure 3).

TABLE 4
SANITARY SEWER WASTE CHARACTERIZATION DATA SUMMARY

Analyte Group	Analyte	Total Number Samples Analyzed	Detection Frequency	Average Conc.	Maximum Conc.	WRW AL	Unit
Metal	Aluminum	9	100%	11456	30000	228000	mg/kg
Metal	Antimony	9	67%	2.0	4	409	mg/kg
Metal	Arsenic	9	100%	7.7	26	22.2	mg/kg
Metal	Barium	9	100%	113	210	26400	mg/kg
Metal	Beryllium	9	89%	0.7	1.5	921	mg/kg
Metal	Cadmium	9	78%	4.6	12	962	mg/kg
Metal	Chromium	9	100%	232	1300	268	mg/kg
Metal	Cobalt	9	100%	11	26	1550	mg/kg
Metal	Copper	9	100%	284	770	40900	mg/kg
Metal	Iron	9	100%	68333	230000	307000	mg/kg
Metal	Lead	9	100%	138	500	1000	mg/kg
Metal	Lithium	9	89%	8.1	17	20400	mg/kg
Metal	Manganese	9	100%	328	870	3480	mg/kg
Metal	Mercury	9	100%	3.8	31	25200	mg/kg
Metal	Molybdenum	9	100%	9.2	32	5110	mg/kg
Metal	Nickel	9	100%	120	550	20400	mg/kg
Metal	Selenium	9	22%	1.9	2	5110	mg/kg
Metal	Silver	9	100%	25	160	5110	mg/kg
Metal	Strontium	9	100%	42	76	613000	mg/kg
Metal	Tin	9	89%	43	290	613000	mg/kg
Metal	Uranium, Total	9	78%	61	370	2750	mg/kg
Metal	Vanadium	9	100%	31	56	7150	mg/kg

2 Although the waste in the sewer lines is not soil, the comparison was made to the WRW ALs because of the potential for the material to impact surface water.

9

Analyte Group	Analyte	Total Number Samples Analyzed	Detection Frequency	Average Conc.	Maximum Conc.	WRW AL	Unit
Metal	Zinc	9	100%	976	3600	307000	mg/kg
Radionuclide	Americium-241	9	33%	0.7	1.06	76	pCi/g
Radionuclide	Plutonium-239/240	9	33%	4.0	6.042	50	pCi/g
Radionuclide	Uranium-234	9	78%	3.5	6.95	300	pCi/g
Radionuclide	Uranium-235	9	44%	2.6	9.814	8	pCi/g
Radionuclide	Uranium-238	9	78%	3.5	6.95	351	pCi/g
	Above the Wildlife Refuge Worker Action Level						

Note: Analytes shown are those that were detected and have a Wildlife Refuge Worker Action Level.
WRW – Wildlife Refuge Worker
AL - Action Level

Fate of Constituents Released to Environment

PAC 000-500 has been assessed to render a No Further Accelerated Action (NFAA) determination. The sanitary sewer lines including smaller lines, main lines and abandoned lines are not significant contaminant sources at RFETS for the following reasons (DOE 2004a):

- Sanitary sewer lines and components associated with buildings were removed to a depth of 3 feet below the final grade as stated in the Facility Disposition RSOP (DOE, 2000). These are predominately smaller lines and represent a large percent of the total sewer line length due to the number of lines beneath and around facilities. Also, some sewer lines were connected to administrative buildings or other non-process buildings and were never associated with processes that could contaminate the lines.
- The closure of operating lines, manholes, and lift stations, as well as the disruption of key utility trenches has effectively disrupted contaminant pathways to surface water from the sanitary sewer (see Figure 5).
- PACs associated with specific releases to or from the sanitary sewers either have been closed (PAC 800-145 - Sanitary Waste Line, PAC 800-106 – Building 881 Outfall), have an approved no further action (PAC 900-141 - Sludge Dispersal, PAC 100-604 - T130 Complex Sewer Line Breaks), or will be addressed through closure of IHSS Group 700-3 (PAC 700-144 - Sewer Line Break).
- The main contaminant source to the sanitary sewer system was laundry waste that was discontinued many years ago. The Building 442 laundry was one of the first laundries at the site and was known to have discharged wastewater into the sanitary sewer with potentially radioactive contamination (see Table 1). Because it was active early in plant history, the discharge levels were most likely the highest that occurred. During accelerated action for IHSS Group 400-7 in 2002, five feet of a sewer line underneath the Building 442 slab was removed outside of the building to more than 6-feet below grade, to the point where this cast iron pipe

10

was joined to a 6-inch PVC pipe. Even though the joint consisted of a dilapidated rubber boot, no soil contamination was present. Solids in the line were sampled and analyzed, and the remaining line was plugged at both ends. Because some contaminated material in the pipe was left in place, the Subsurface Soil Risk Screen was performed (DOE 2004c) as described in Attachment 5, Section 5.3 to RFCA (DOE et. al 2003). The screen indicated an accelerated action is not warranted.

- All of the major contaminant discharges to the sewer system happened prior to 1990 (see Tables 1 and 2). There has not been a major incident since the February 1989 chromic acid spill. Significant quantities of sewage have likely been discharged through these lines since these incidents occurred. Much tighter controls over hazardous wastes, radionuclides and other potential contaminants were implemented in the 1980s and 1990s at RFETS greatly reducing the number of spills that could have impacted the sewer system as documented in the few incidents occurring in the 1990s. Other measures were also taken including an intensive effort to label all drains and an evaluation of lines to ensure that they were separated from hazardous and radiological sources.

- High contaminant concentrations in sewer lines were not found except near buildings. At these locations, pipes were removed or pipelines isolated.

- Jetting of the main lines eliminated significant solids within the main lines. While no data were collected from the removed solids, the jetting equipment was not radiologically contaminated during the operations, indicating that significant levels of removable radioactivity are not present in the main system. Fixed contamination in the lines will not result in contamination release. As stated above, major contaminant discharges to the system no longer occur. Therefore, contamination of these lines after flushing is unlikely.

- Infiltration and inflow studies indicate that water leaks into the sanitary sewer system, and that exfiltration is minimal. Therefore, contamination in the soil along the sanitary sewer system is unlikely. This is due in part to most of the system being gravity flow rather than pressurized. Additionally, it is anticipated that even if the overall site water table rises after Site Closure, the grouting at manholes will further isolate the residual sanitary sewer lines, eliminating these as a pathway.

- In recent years, a number of modifications were made to prevent infiltration and, coincidentally, exfiltration of the sewer lines. Lines were slip-lined to seal joints and other areas that could potentially leak.

- Biosolids are similar to residual solids that may remain in the sanitary sewer lines. Since the largest lines were flushed, there may only be negligible amounts in these lines. In abandoned lines that were not flushed, the amount could vary. However, biosolids data (DOE 2004c) indicate that this material is not a risk to the environment.

- Contaminant concentrations in the most recent influent to the B995 treatment facility were well below surface water action levels except for acetone, copper,

11

zinc and mercury. As a consequence of the closure activities, the sources of these constituents were removed, or if present in the sewer lines, the pathway of contaminant release to surface water was disrupted.

- Large volumes of relatively clean water continued to flush the system until the sanitary sewer system was closed. This had the effect of further reducing or eliminating contaminated solids within the system.

Action/No Further Accelerated Action Recommendation

PAC 000-500 is proposed for NFAA. All of the major contaminant discharges to the sewer system happened prior to 1990. Significant quantities of sewage have been discharged through these lines since these incidents occurred, which has served to flush the lines. Jetting of the main lines served to further eliminate significant solids. Also, infiltration and inflow studies indicate that water leaks into the sanitary sewer system, and that exfiltration is minimal. Therefore, significant contamination surrounding the sewer lines is unlikely. In addition, shallow sanitary sewer lines and components were removed to a depth of 3 feet below the final grade, and the closure of deeper lines, trunk lines, manholes, and lift stations by grouting, as well as the disruption of some utility trenches, has effectively disrupted contaminant pathways to surface water from the sanitary sewer. The sanitary sewer system is not significant contaminant sources at RFETS.

References

EPA, CDPHE, 1999. Correspondence to J. Legare, DOE RFO, from T. Rehder, EPA Region VIII, S. Gunderson, CDPHE, RE: 1997 Annual HRR Review, July 9, 1999.

EPA, CDPHE, 2002. Correspondence to J. Legare, DOE RFO, from T. Rehder, EPA Region VIII, S. Gunderson, CDPHE, RE: Approval of NFA Designation for IHSSs & PACs, February 14, 2002.

DOE, 1992, Historical Release Report for the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado, June.

DOE, 1997, OU 1 Corrective Action Decision /Record of Decision, Rocky Flats Environmental Technology Site, Golden, Colorado, February.

DOE, 1999, Annual Update, Historical Release Report, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, 2002, Annual Update, Historical Release Report, Rocky Flats Environmental Technology Site, Golden, Colorado, August.

DOE, 2003, Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation, Modification 1, Rocky Flats Environmental Technology Site, Golden, Colorado, September.

DOE, CDPHE and EPA, 2003, Modifications to the Rocky Flats Cleanup Agreement Attachment, U.S. Department of Energy, Colorado Department of Public Health and

12

Environment, and U.S. Environmental Protection Agency, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

DOE, 2004a, Technical Memorandum – Closure Strategy for the Rocky Flats Environmental Technology Site Sanitary Sewer System, August.

DOE, 2004b, Rocky Flats Environmental Technology Site, Integrated Monitoring Plan Background Document, FY2004.

DOE, 2004c, Facility Disposition RFCA Standard Operating Protocol, rev 1, Rocky Flats Environmental Technology Site, Golden, Colorado, March.

DOE, 2004d, Environmental Restoration, RFCA Standard Operating Protocol for Routine Soil Remediation, FY03 Notification #04-04, IHSS Group 700-3, July.

13

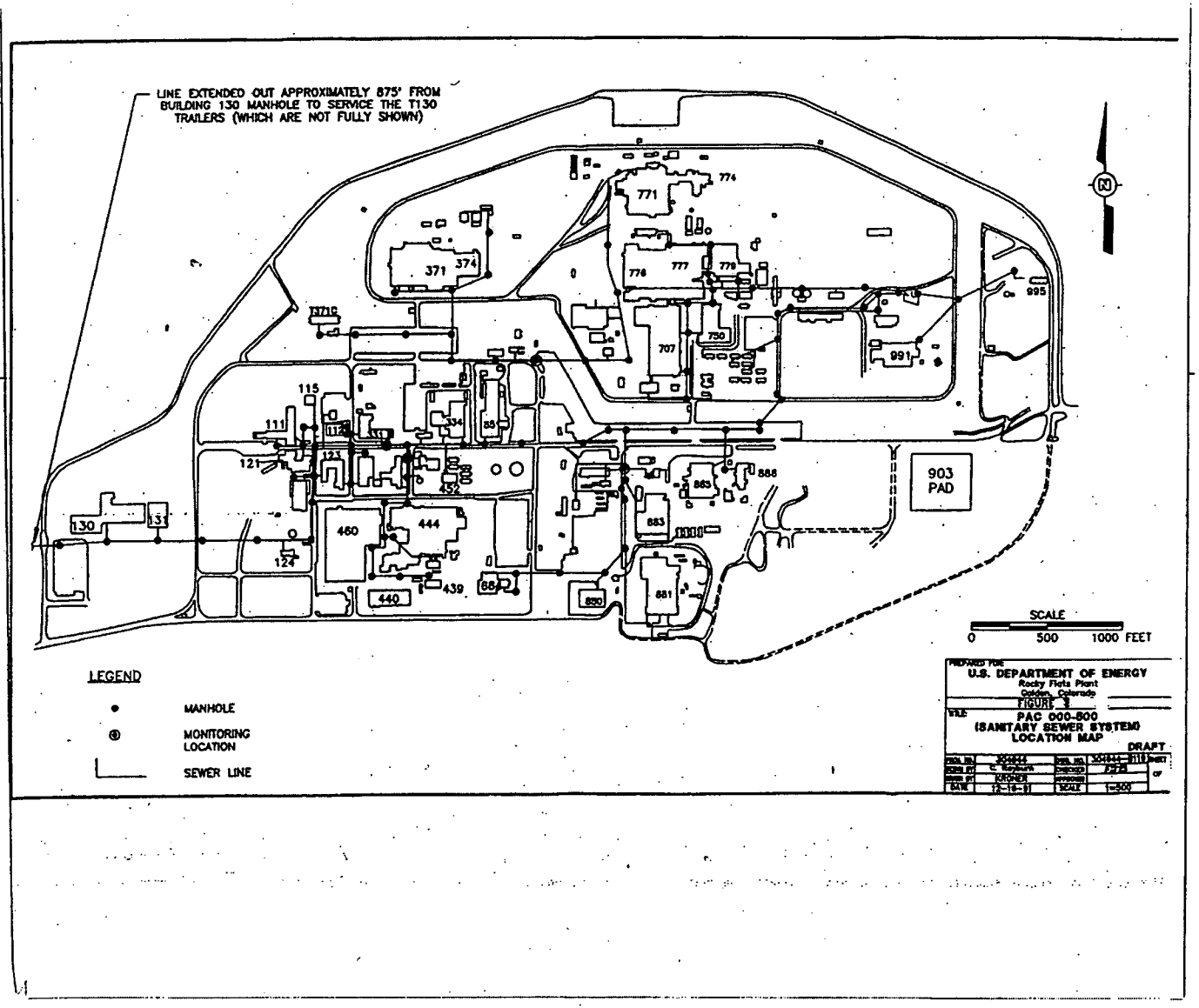

LINE EXTENDED OUT APPROXIMATELY 875' FROM BUILDING 130 MANHOLE TO SERVICE THE T130 TRAILERS (WHICH ARE NOT FULLY SHOWN)
774
771
371
374
776
777
778
995
707
750
991
115
111
121
452
886
865
903 PAD
130
131
460
444
883
124
439
440
881
LEGEND
MANHOLE
MONITORING LOCATION
SEWER LINE
SCALE
0
500
1000 FEET
PREPARED FOR
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant
Golden, Colorado
FIGURE 3
TITLE
PAC 000-800
(SANITARY SEWER SYSTEM)
LOCATION MAP
DRAFT

Figure 2

Sanitary Sewer System at Closure

KEY

- Manhole
- Lift Station
- Cleanout
- Sanitary Sewer, Flushed and Plugged
- Abandoned Line, Flushed and Plugged
- Abandoned Prior to 1990
- Sewer on Drawing but not Located
- Sanitary Sewer, Removed D&D
- Disrupt Utility Trench

Standard Map Features

- Dirt Roads
- Paved Roads

Buildings and Other Structures

- Demolished
- Standing

DRAFT

N
W E
S

400 0 400 Feet

Scale 1:4,000

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by:

Date: November 30, 2004

RADMS

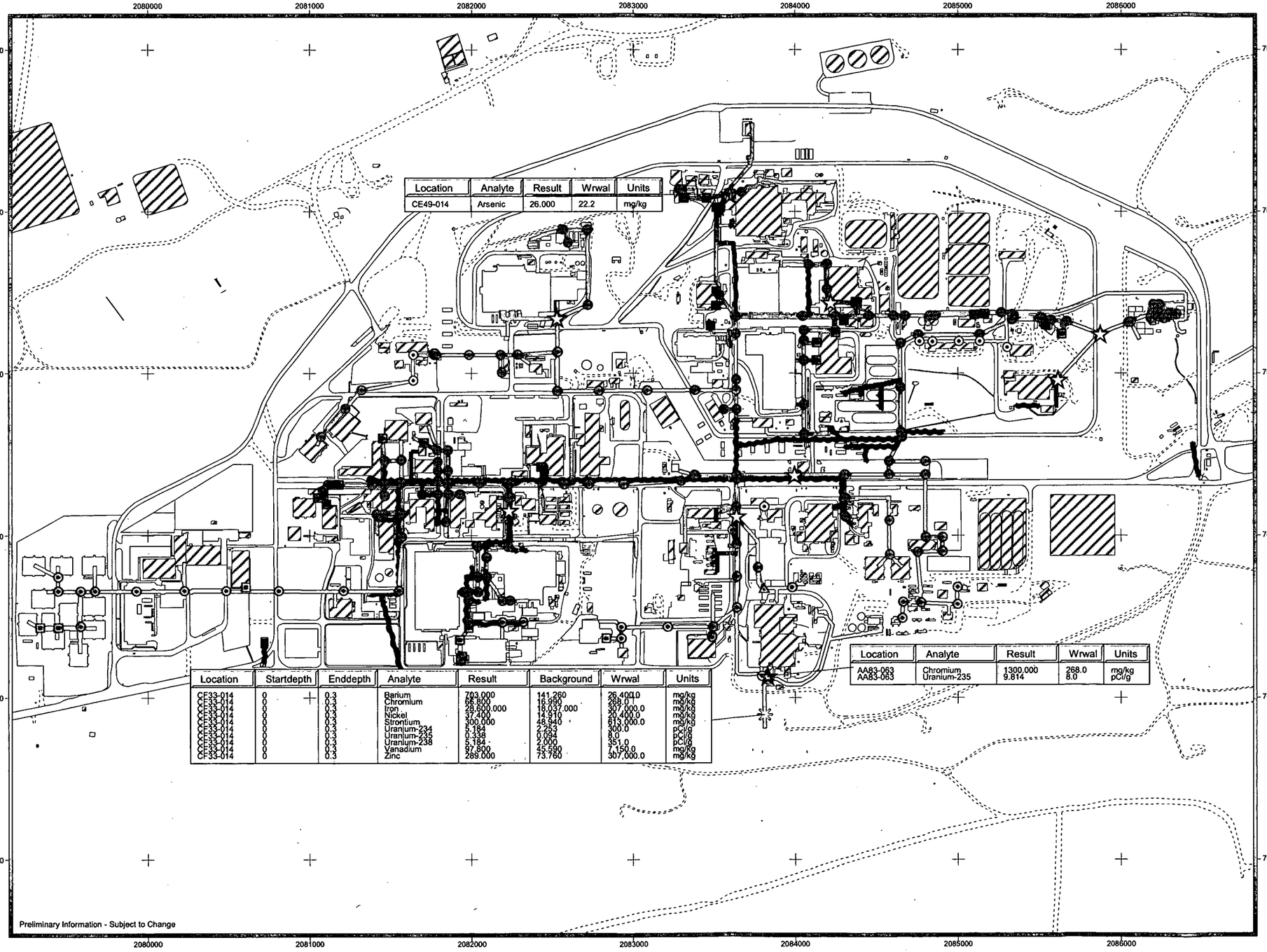
Prepared for:

KAISER•HILL COMPANY

File: W:\Projects\Fy2004\000-3\
CLOSEOUT-sanitary-sewer-sampled--manholes-mh.apr Layout: Fig 2

15

Figure 3
Sanitary Sewer System Surface Soil and Waste Sample Results



Location	Analyte	Result	Wrwal	Units
CE49-014	Arsenic	26.000	22.2	mg/kg

Location	Startdepth	Enddepth	Analyte	Result	Background	Wrwal	Units
CF33-014	0	0.3	Barium	703.000	141.260	26,400.0	mg/kg
CF33-014	0	0.3	Chromium	66.800	16.990	268.0	mg/kg
CF33-014	0	0.3	Iron	28,600.000	18,037.000	307,000.0	mg/kg
CF33-014	0	0.3	Nickel	37.400	14.910	20,400.0	mg/kg
CF33-014	0	0.3	Strontium	300.000	48.940	613,000.0	mg/kg
CF33-014	0	0.3	Uranium-234	5.184	2.253	300.0	pCi/g
CF33-014	0	0.3	Uranium-235	0.338	0.094	8.0	pCi/g
CF33-014	0	0.3	Uranium-238	5.184	2.000	351.0	pCi/g
CF33-014	0	0.3	Vanadium	97.800	45.590	7,150.0	mg/kg
CF33-014	0	0.3	Zinc	289.000	73.760	307,000.0	mg/kg

Location	Analyte	Result	Wrwal	Units
AA83-063	Chromium	1300.000	268.0	mg/kg
AA83-063	Uranium-235	9.814	8.0	pCi/g

Key

- Surface Soil Sample Above Background
- Waste Sample Above WRW AL
- Waste Sample Below WRW AL
- Manhole
- Lift Station
- Cleanout
- Sanitary Sewer Line, Flushed and Plugged
- Abandoned Line, Flushed and Plugged
- Line Abandoned Prior to 1990
- Sewer on Drawing but not Located
- Sanitary Sewer, Removed D&D
- Disrupt Utility Trench

Standard Map Features
- Dirt Roads
- Paved Roads

Buildings and Other Structures
- Demolished
- Standing

DRAFT

NOTES:
Manholes (circular point features), Lift Stations (triangular point features) and Cleanouts (square point features) follow the same color categorizations as the sewer lines. (Sampled Locations indicated by a blue asterisk).

Abandoned Lines with a squiggly line were abandoned before 1990. Abandoned lines without a squiggly line were abandoned after 1990.

400 0 400 Feet

Scale 1:7,500

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: RADMS

Prepared for: KAISER•HILL COMPANY

November 24, 2004

File: W:\Projects\FY2004\000-3\CLOSEOUT-sanitary-sewer-sampled-manholes-mh.apr Layout: Fig 3

16

Figure 4 Best Management Practices at Manholes

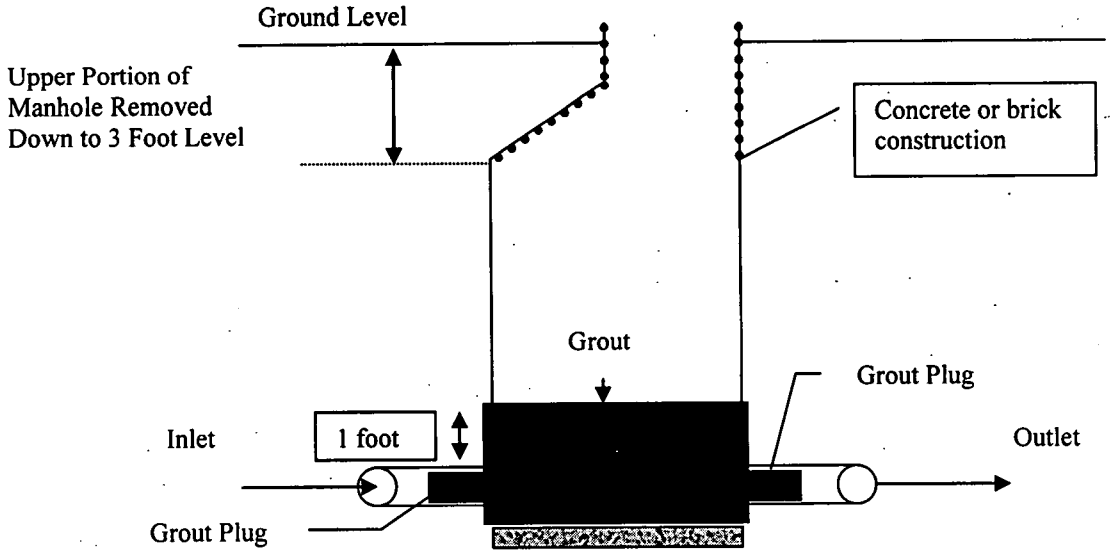


Figure 5 Contaminant Pathway to Surface Water Disruption